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ABSTRACT

Distance education, especially in the form of correspondence study, is not a new phenomenon, but the success of the British Open University has given it a new image. Distance education programs have been developed to respond to a variety of societal and educational situations for which traditional classroom-based approaches are less feasible. They may also be preferred over classroom programs by students for whom flexibility, freedom, autonomy, and price are important. Designers of distance instruction must accommodate a number of variables which are not normally encountered by designers of materials for teacher-centered programs. Probably the most salient of these problems is the distance aspect of the instructional process, but the need for personalization, an effective teaching/learning approach tailored to the distance situation, and the special dynamics of the distance course development process are all aspects to be considered. Distance education represents fertile ground for both theory-oriented and practice-oriented research on instructional processes. Recent developments in learning and instructional theory hold great promise for the advancement of instructional design science. An orderly means is needed for dissemination of this knowledge into the practice of distance education. (KC)

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Instructional Design for Distance Training

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Instructional Design for Distance Training

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As the new kid on the block, distance training or distance education is really an old kid with a new name and a new set of clothes. The old name was "correspondence education" and under this rubric it has been present on the American scene for approximately 90 years, providing services to as many as fifty million students (Fowler, 1981). However, under the old designation distance education was able to attain only a very modest level of acceptance within the bastions of conventional American education, with its commitment to residential face-to-face study. Indeed, like Cinderella before the advent of the Fairy God-Mother, correspondence education has generally been relegated to handling the instructional chores which her older sisters either couldn't or didn't choose to perform such as providing educational and training opportunities to those who by reason of employment or geographical isolation could not pursue programs of the more conventional sort. Many viewed it as a second choice and second class educational approach.

But, "Voila!" with a wave of her magic wand a Fairy God-Mother has appeared. Correspondence education's name and image have been changed and she has been given an invitation to the ball. The new name is "distance education," or some variation such as distance training, distance teaching or distance study. The new set of clothes exists in the form of emerging print, tele-communication and computer technologies. An excellent overview of some of these possibilities has been given by Fletcher (Note 1). Suddenly, our educational Cinderella has been brought out from behind the pots and pans and given a chance to establish her legitimacy as a fully acceptable member of the educational family.

I suppose you're wondering who I think the Fairy God-Mother is. Well, in my childhood the Fairy God-Mother was always British, so it shall come as no surprise to find distance education's Fairy God-Mother residing in the British Isles, at Milton Keynes to be exact, and in the form of the British Open University. There is no question that the worldwide attention focused on this highly successful distance education institution has contributed tremendously to a heightened awareness of the possibility of non-residential instruction as a way to meet many of the educational needs in both developed and developing countries. And, in some cases, as a first-choice alternative.

In this paper I will explore some issues related to the design of instruction for a distance approach. To lay a groundwork for that I will first outline a definition and rationale for distance education and describe the role it can play in providing educational services to publics not served well by traditional means. Next, I would like to emphasize the special characteristics of distance education which must be accommodated in instructional design. And, finally, I will mention some implications of recent learning and instructional research for the design of

materials and programs and suggest why this may be a desirable context for conducting studies of instructional processes.

What is Distance Education?

There have been many attempts to develop a listing of the critical attributes in a definition of distance education. This has sometimes produced a vigorous debate (e.g., Baath, 1981; Keegan, 1980). In general, however, there is agreement that distance education involves a form of study in which students are physically separated from teachers (the element of distance) and which depends largely on written, mechanical, electronic or other non-contiguous forms of two-way communication (Holmberg, 1979). Over the years the most common form of two-way communication in distance education has been postal (the correspondence education model) but in recent years systems employing radio, television, newspapers, audio-cassette tapes, telephones and computer-based components have been developed. On balance, though, it is fair to say that postal two-way communication is still the predominant means employed in systems of distance education and training.

One of the characteristics which has been emphasized by some writers is the tendency for distance education to be an "industrialized" form of education (Keegan, 1980; Peters, 1971). By this is meant that the development and administration of distance education programs are generally characterized by the methodologies of mass production. This is possible because distance study programs are designed to be replicable over large numbers of individuals and are usually presented in some "hard copy" format. Consequently, there are economies of scale which tend to yield cost and efficiency benefits. Of course, there may also be negative trade-offs in an industrialized approach such as a loss of personalization in the educational program. More will be said on this point later in the paper.

Why is Distance Education?

I suppose it is fair to ask why distance education programs and institutions have come into existence and in what way they serve publics different from those served by conventional institutions. In so doing, we can establish a framework for considering the challenges to be met by the instructional design process in distance education.

Perhaps the most commonly recognized reason why persons select distance learning programs relates to their desire for an educational opportunity not available from conventional sources or not pursuable because of time and space constraints. The genius of distance study is that students can stay where they are, doing what they are doing and still attain educational goals. Of course, some of these students would prefer to be studying in a traditional residential setting and have only enrolled in a distance program because no traditional program exists. For these, distance study represents a second choice alternative.

Bonani (Note 2) has suggested that distance study may attract students who have experienced failure in previous educational undertakings. He characterized this as a form of "scholastic recuperation" for students who are seeking to rectify educational deficiencies but are past the normal schooling age. This may be an especially important role for distance education in societies where there is a high secondary school drop-out rate. However, providing educational programs to such a population involves special challenges. Distance programs may be more convenient but there is no reason to believe that they are "easier," especially for students who haven't done well in previous schooling.

Many students pursue distance education programs in order to acquire skills needed for career advancement and development without interrupting an existing profession. Because distance education provides flexibility in the use of time and space not typically available from traditional institutions, these individuals may find distance study to be the best way to achieve academic goals with the least sacrifice of personal life style.

For many of the situations mentioned above there is a tendency to view distance education as the alternative of second choice--the one chosen only when no traditional program is available. However, there are reasons to assert that for many individuals distance education may be a selection of first choice. Let's look at some of these.

Reasons for choosing a distance education program over an available conventional program may include flexibility in pacing, greater freedom of choice in selecting goals, greater personal autonomy, access to the unique expertise of a course writer, availability of special media combinations or program features made possible by the generally greater concentration of resources in course development, and so on. Moreover, some research suggests that students who choose distance education programs may be of a different sort than those who choose residential programs. Moore (Note 3) found that distance education attracted students who were more autonomous as a cognitive style characteristic than those who study in classroom settings. Thus, it appears that many distance education students choose this form of study because it better suits their personal and life styles than does classroom-based education.

Finally, there is the factor of cost. Daniel and Stroud (1981) cited published studies on costs for the British Open University and concluded that "no matter how the analysis was done the Open University provided education at a substantially lower cost than conventional universities" (p. 149). This should not be particularly surprising given the economies of scale available to a distance education system. These economies are usually reflected in lower tuition charges to students.

No doubt there are those who would claim that all of the above notwithstanding, there is still no substitute for the warm body of a knowledgeable teacher holding forth before an assembly of enraptured students as a truly first-rate educational experience. Surely, it then follows, this must

provide an increment in learning not obtainable in a distance education system. For the record, it must be said that the empirical data do not support this proposition. If there is some unique contribution made by educational endeavors of the face-to-face variety, it has not been documented through available achievement measures. Both Childs (1971) and Macken, van den Heuvel, Suppes and Suppes (1976) concluded after a review of research comparing correspondence and other forms of instruction that correspondence students achieve as much as students studying in other ways and when there is a difference it tends to favor the correspondence study method.

Summary

Distance education, especially in the form of correspondence study, is not a new phenomenon, but the success of the British Open University has given it a new image within the general educational community. Distance education programs have been developed to respond to a variety of societal and educational situations for which traditional classroom-based approaches are less feasible. They may also be preferred over classroom programs by students for whom flexibility, freedom and autonomy are important. Moreover, the available evidence suggests that students who pursue distance education studies achieve at least as much as those who pursue study programs of another sort.

Although programs of distance study may produce achievement levels equivalent to those obtainable through conventional means, they do represent a divergent approach. Designers of instruction to be delivered at a distance must accommodate a number of variables which are not normally encountered by designers of materials for teacher-centered programs. It is these special characteristics which we will consider in the next section.

Instructional Design Considerations in Distance Education and Training

In many respects programs of distance education are a form of individualized study similar to the Keller approach (Keller, 1968), the audio-tutorial method (Postlethwait, 1969) and programmed instruction in its various forms. Instructional design for a distance education program, therefore, would be similar to that for any such program, and would include a concern for needs assessment, prespecified objectives, criterion-referenced testing and instructional feedback. In addition, there are several other factors which enter into the situation. These include the distance aspect, the need for personalization, the special dynamics of the teaching process, the nature of the instructional support system and the roles and functions involved in the design/development process, itself.

The Distance Aspect

Probably the most salient characteristic of distance education is the distance aspect itself. Unlike most other forms of instruction, the

student is assumed to be physically separated from the teacher/tutor. Moreover, communication between them is mediated through some written, mechanical or electronic device, as mentioned earlier. Thus, the need for carefully thought-out instructional sequences is paramount.

Since the opportunity for students to obtain clarification of poorly understood material may be hampered by a communication time-lag measured in days or weeks, it behooves the instructional design system to minimize the need for such interactions. The developer must make the Murphyesque assumption that "what can be misconstrued, will be" and plan accordingly. Childs (Note 4) said the correspondence writer "must learn not only to express himself so that he may be understood but also in such a way that he may not possibly be misunderstood" (p. 18). Obviously, this implies a level of instructional clarity beyond that required by most classroom situations or by those forms of individualized study which assume the presence of a teacher or tutor at some not-too-distant location. In fact, the distance student can seldom benefit even from that level of instructional assistance which can be gained from other students since they are also not conveniently at hand.

Of particular importance, therefore, is the provision for formative evaluation during development of distance texts and programs in order to identify and improve instructional segments of inadequate effectiveness. There is probably no instructional situation which places a greater demand on the instructional design system to produce acceptable stand-alone instructional sequences than a distance education approach.

The Personalization Problem

A major concern for any distance education system is how to maintain a degree of personalization in the study process. Holmberg (1979) has formulated a theory of distance education as a "guided didactic conversation." In his view the interaction between a teacher and student through printed, telephonic and/or audio-visual media constitutes a "conversation" which can attain a personalized quality. This personalization "Is created by an easily readable and reasonably colloquial style of presentation and . . . characterized by, for instance, the author using personal pronouns for self-reference (I or we) and the student being referred to as you" (p. 20).

Bååth (1979) has suggested the possibility of applying a Rogerian model (Rogers, 1969) to certain aspects of a distance education approach in the interest of creating a greater sense of relationship between the student and distance teacher. Interestingly, Bååth and Månsson (1977) reported the successful use of computer generated personalized responses in which 76% of the students indicated a preference for this mode of interaction over hand written responses from tutors. Thus, it appears that it is possible to use impersonal methods to achieve personalized instruction.

It is fair to ask whether there is any empirical evidence to support

the desirability of personalizing distance study courses. I have been unable to locate a published experimental study which directly manipulated this variable. The justification for the practice, which is widely held among distance educators (Bááth, 1979), seems to be mainly theoretical and intuitive.

The Teaching Process

Distance education involves "teaching," not just provision of an opportunity to learn. By this I mean it is necessary for designers of distance study programs to take seriously the proposition that if a cooperative student who fits within the profile of the intended audience conscientiously follows through on study assignments and finds the program insufficient to produce the intended outcomes, then it's the fault of the study program rather than the student. This proposition, of course, is basic to the mastery learning approach to instruction (Block, 1971). It takes on added significance in a distance education setting because in addition to facing the usual demands of a learning situation students must do so using an unfamiliar study method.

This suggests that the learning-to-learn process is a particularly important one in distance education. One reason the drop-out rates for distance study are so large may be because we have given insufficient attention to this problem. Students who have spent twelve years, more or less, learning under the direct guidance of a teacher and educational system which closely supervises the pace and sequence of study are suddenly faced with a good deal more independence and personal control over the study process than they have ever before had. The need for considerable self-initiative and discipline is obvious. Moreover, they must learn how to make the system of two-way communication, however "personalized," work for them.

Studies have shown that the students most likely to follow through with a distance education program are those who submit their first lessons soon after receiving them (Macken, et al., 1976). This suggests the importance of helping students to get started properly by providing for helps and motivational devices within the course materials or associated instructional support system.

It must be noted that distance teaching institutions, especially private correspondence schools, have not always developed instructional systems which sought to maximize course completion rates. Sometimes there are greater profits with high enrollments and low completions. Mitford's (1970) article in the Atlantic Monthly highlighted problems such as this with one widely known correspondence school. Since then, legislation and the efforts of accrediting bodies such as the National Home Study Council (Fowler, 1971) have ameliorated these problems. It is even possible to conceive of systems where the economic incentives are structured to encourage course completions. Government subsidized programs in some European countries, for instance, have this characteristic.

But these are economic and ethical issues rather than instructional ones. It is clear that the instructional problem is to develop a system that encourages the starting and completing of distance courses. In this regard distance educators have been particularly innovative in designing instructional systems which provide support for the study process. Interestingly, some of these approaches reintroduce an aspect of direct contact between students and teachers. These include face-to-face teaching/discussion sessions, telephone tutoring, regional study centers for student-teacher and student-student encounters, etc. Efforts such as this tend to have the primary effect of increasing the proportion of starters and completers in distance courses (Båath, 1981).

Earlier I mentioned the importance of providing a thoroughly thought-out instructional sequence. Elements in such a sequence are normally considered to include statements of objectives, advance organizers, content outlines, segments of content, study questions and exercises, self-tests, etc. In addition, there is the need for ample procedural directions and explanations to see that the student can move easily from activity to activity. These constitute the "glue" which holds the other elements together and assures that students proceed efficiently through the course.

One function that can be served by procedural instructions is to provide students with guidance in individualizing their own study. There have been many attempts to design instructional sequences of the branching sort described by Crowder (1963). Although theoretically appealing, instructional sequences with branching capabilities have not been found to have sufficient practicality for general use. The basic problem is the extensive development work needed to produce sequences which only a few students may need. As an alternative designers of distance study programs could provide guidance to students on how to monitor and evaluate their own performance while studying, and what to do about it. The CADE (Computer Assisted Distance Education) system described by Båath and Månsson (1977) does this to some degree using a computer for personalized comments on student exercises. However, it is also desirable to build remediation prescriptions and devices into the actual course materials so students can pursue self-tailored study routines without the time-lag inherent in most distance education communication systems. In some measure this can help to solve the problem of how to accommodate individual differences encountered with all forms of standardized, pre-packaged instruction.

The Instructional Support System

Designers of distance courses cannot content themselves with the development of narrowly conceived self-contained instructional sequences. Distance courses exist within a complex educational system which may have as much or more to do with student success than the materials being studied. It is the instructional support system which determines how much freedom students will have to select program objectives; whether or not their study will operate within a self- or externally-imposed time frame; the

opportunity for tutorial consultation and guidance in academic planning and problem solving; what sort of communication system will be used, and how to make it work so as to reduce the inherent discontinuity in the communication process; whether there is an opportunity for face-to-face, telephonic or other forms of direct interactive contact with teachers; etc. These are larger system concerns, constraints and parameters with which designers have to deal in course planning. Ideally, many of these factors can be specifically determined as part of the course design stage, but sometimes they are already fixed by the institutional makeup. If this is the case, they will still need to enter into consideration as parameters to be accommodated in course design. Even then, designers should seek ways to vary aspects of an instructional support/management system to the advantage of the student wherever possible.

The major challenge, as pointed out by Daniel & Stroud (1981), is to achieve a balance between those activities a student can perform independently and those which are facilitated by interaction with others in the system. Economically there are advantages to a "lean" system, instructionally, the advantages generally lie with a "rich" system. In my view, the role of the instructional designer is to be an advocate of the instructional concerns while recognizing the reality and necessity of working within economic constraints in regards to design alternatives.

The Design/Development Process

Not only does instructional design for distance education face the need to accommodate a set of special characteristics but it must also cope with a particular set of role and function dynamics. A central concern in any distance education undertaking is how best to design and develop the instructional materials and systems to be used. A very common approach to this is to contract with teachers of a subject matter to produce a course. This includes both the course content and teaching components. In this situation the teacher/writer is usually not a permanent staff member of the distance education institution. Consequently, the institution employs editors to work with the materials prior to publication and staff teachers or tutors to grade lessons and interact with students as they pursue their studies.

Other patterns involve a team-based approach. This is the strategy followed by the British Open University and according to Perry (1977) represents "the most important single contribution of the Open University to teaching practice at a tertiary level" (p. 91). In this methodology course developers are full-time university staff members assisted by educational technologists and radio and television producers. Perry points out that the role of various members of the team tends to vary as a function of course subject area. Humanities and Social Sciences courses tend toward individual development by the discipline-oriented faculty member with the other team members serving a consulting role, while Math and Science courses tend to be developed more through collective effort. Moreover, Daniel and Stroud (1981) have suggested that the role of the educational

technologist in this system has become somewhat problematical as content-oriented academic staff have gained skill in instructional development and depend less on the assistance of the technologists.

There are many possible variations of the two approaches described above. For instance, at the International Correspondence Institute (ICI) in Brussels, where I have worked, the approach is somewhere in between the two. ICI employs part-time writers as content experts whose primary responsibility is for subject content and uses an in-house instructional development staff to produce the instructional components of the course. This is also a team oriented approach, but it preserves the primary role for the developer.

All of this is to say that in distance education there are various roles and relationships among those responsible for course development which have to be sorted out. This is especially true in regards to those whose primary experience has been in teaching in a traditional institution. Because teachers are used to delivering "content" and handling the educational process in a more or less ad hoc manner, they may be insufficiently sensitive to the instructional dynamics involved in distance study. As Erdos (1975) put it, "The main difficulty in teaching by correspondence is that many writers feel they have only to write uninterrupted pages of factual content" (p. 21). Moreover, Perry (1977) has alluded to the reduction in individual academic freedom which results from a team oriented development approach. Add to this the problem of effectively positioning the instructional development expertise of an educational technologist and marrying all this with production line techniques and schedules, and the network of relationships, roles and functions becomes exceedingly complex.

Adding even more complexity are the emerging technologies which will eventually take their place as part of distance learning systems (Fletcher, Note 1). These hold out the prospect that not only will course development teams need content experts, educational technologists and media producers, but specialists in computer and video-disk technologies, as well. Instructional software development will become more and more difficult as these technology options become available and new professional roles and relationships will need to be integrated into the development process. Those most comfortable with the paper, pencil and postage-stamp technologies of the past may find the transition a traumatic one.

Summary

In this section I have tried to describe some of the distinctive characteristics of distance learning systems which present a particular challenge to an instructional design process. Probably the most salient of these is the distance aspect, but the need for personalization, an effective teaching/learning approach tailored to the distance situation, and the special dynamics of the distance course development process are all aspects to be considered. They combine to produce a complex and

challenging setting in which to examine and apply educational theory.

Implications of Recent Learning Research for Distance Education

As everyone knows who has pursued the course of learning research over the past two decades, there has been a shift from a behavioral to a cognitive approach. Recent reviews by Greeno (1980) and Calfee (1981) have detailed this transition. Moreover, this has had an effect upon the way researchers are thinking about education and instructional design (e.g., Gallagher, 1979; Merrill, Kelety, & Wilson, 1981; Wittrock, 1976).

Nevertheless, I believe it is fair to say that the imprint of behavioral psychology has been, and still is, broadly apparent. For instance, despite the reservations expressed by some researchers concerning behavioral objectives (e.g., MacDonald-Ross, 1973) they are still widely used in distance education (Holmberg, 1979; Carter, in press). Other practices such as the requirement for student responding and provision of corrective feedback are also prevalent. Although cognitive research has begun to provide better insights into the role various kinds of instructional activities can play in the formation of knowledge structures, until now it has produced relatively minor changes on a terrain which has derived its primary features from behaviorism. Not only is this true for the learning systems being developed but also for the processes used to develop them.

But there is no question that the influence of cognitive theory will grow. Probably the greatest strides thus far have been made toward an understanding of knowledge structures and their relationship to subject matter organization. This corresponds roughly to the first element in Glaser's (1976) four components of a theory of instruction. Unfortunately, sophisticated schemes for mapping conceptual relationships in subject matter are difficult for even individuals trained in cognitive psychology and psycholinguistics to apply. For the instructional design practitioner they are well-nigh impossible to apply. Thus, it seems to me that it is in the explication of how various task demand requirements affect cognitive processing and the consequent development of cognitive structures and skills which has the broader general application to design/development practice. We need a comprehensive taxonomy of these activity-outcome relationships at a sufficiently detailed level to give guidance to practitioners who are not themselves cognitive scientists.

Toward this end it would be helpful for cognitive researchers to give greater attention to the practical implications of their work. I would suggest that distance education presents a likely setting for applied research on instruction since many of the variables which are problematical in classroom research are controllable due to the structured nature of distance study.

Consider, for example, the recent instructional model presented by Rothkopf (1981). Six variables were described which are thought to

influence the probability that a particular instructional event or event sequence will be successful. These variables are:

- I - The number of redundant instructional events
- A-C - Attendance to instruction and compliance with assignments
- D - Disparity between the instructive event and the learning goal
- E - Experience of student relevant to instruction
- m - Likelihood of sufficient mathemagenic processing by student
- R - Retrievalability of learned information or competence.

It should be fairly obvious that such a model maps naturally upon the kinds of instructional sequences which characterize distance study. Because the events of instruction are represented objectively and concretely in either the instructional materials given to students or the two-way communication system, it should be relatively easy to manipulate the variables outlined by Rothkopf in a systematic manner. At least, more so than for most teacher-dependent instructional systems.

Distance education represents fertile ground for both theory-oriented and practice-oriented research on instructional processes. However, educational researchers in this country have largely ignored this subject. Perhaps our Fairy God-Mother will help to rectify this problem, as well.

In any event, recent developments in learning and instructional theory hold forth great promise for the advancement of instructional design science. What is needed is an orderly means for the dissemination of this knowledge into the kinds of rules, procedures and guidelines which can inform practice. I hope seminars such as this one can stimulate activity in that direction.

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